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CONTENTS

	PAGE
Editorial Notes	295
Milk Fever before Calving H. C. I. Kelly, M.R.C.V.S.	295
Abstracts—Infectious Pseudo-Rabies in the Pig: The Treatment of Malignant Catarrhal Fever	296
National Veterinary Medical Association of Great Britain and Ireland—V.M.A. of Ireland (Dublin) Tuberculosis of the Domesticated Animals and the Public Health By Prof. T. G. Browne, M.R.C.V.S.	296
Parliamentary—Government of Ireland Bill	306
Appeal for help to Vienna Veterinary Surgeons: "The Plight of Veterinary Surgeons."	307
Testing for Tuberculosis, U.S.A. : Rabies : Foot-and-Mouth Disease	308
Obituary	308
Diseases of Animals; Summary of Returns	308

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THE VETERINARY RECORD

A Weekly Journal for the Profession.

FOUNDED 1888, BY WILLIAM HUNTING, F.R.C.V.S.

No. 1693. DECEMBER 18, 1920. VOL. XXXIII.

E. Wallis Hoare, F.R.C.V.S.

In the late Mr. Wallis Hoare we have lost one of our most remarkable members. The profession has never had a more industrious worker, and not many more profitable ones.

Wallis Hoare became widely known while still a young man, chiefly by a great number of clinical reports and articles, many of which appeared in this journal. Covering a great variety of subjects, they exercised considerable influence in one broad direction. They illustrated and emphasised the difficulties of clinical diagnosis, and the supreme necessity of post-mortem examination whenever possible. In those days far too many practitioners over-rated their own diagnostic abilities and ignored the value of post-mortem investigation, and here Hoare's work was most valuable.

The rank and file of the profession have made great progress in this connection since then; but most of the advance has been due to quite a few men, of whom Wallis Hoare was one of the most prominent. Only students of the veterinary journals of a generation ago realise how much he did in this respect.

The two books by which Wallis Hoare's name will probably be chiefly remembered are both—if future editions are well edited, capable of doing good service for a long time to come. At present, his *Veterinary Therapeutics* is one of the most useful of the practitioner's smaller reference books, and his ambitious *System of Veterinary Medicine* is something more. The latter is the only British book upon the subject which is in any way comparable to the works of Continental writers. To put it very mildly, our national text-books upon veterinary medicine were anything but a credit to us when this century began. Hoare's *System* removed that reproach, and will remain a landmark in the history of our professional literature.

Hoare was an ardent student, a keen and observant clinician, and a skilful and lucid writer. The combination is not common in our profession, and he turned it to good account. The amount of writing, much of it of a very solid character, that he managed to accomplish amidst the numerous and unavoidable distractions of a busy practice, gives some indication of his tireless industry. It is said that overwork helped to shorten his life, and we can well believe it. Certainly, his life-work was very fruitful to us. Without being an originator, he was a potent educational influence in our ranks; and few veterinarians of this generation have done so much to raise the general standard of the working clinician.

THE TUBERCULOSIS QUESTION.

We print this week, the concluding portion of the long report of meeting of the V.M.A. of Ireland (Dublin). The paper by Prof. T. G. Browne is a good summary of the present position from the practical side. The most important features are the maintenance of the claim of the veterinarian to his proper share in the work of controlling the disease, and the necessity of informing the public of their duty in aiding in the suppression of the disease: and in that connexion our brethren in Ireland are fully alive to the necessity of pressing our claims, and will ably and vigorously support any action in this direction which the executive of the N.V.M.A. may initiate. And it may be remembered that Ireland has probably the cleanest return of freedom from other animal diseases of any State in the world.

The discussion on the paper, too, was able and distinctly practical, and will help to strengthen the position of the profession as a whole.

MILK FEVER BEFORE CALVING.

I don't think this is a very uncommon thing to meet. I have had a number of cases of it in my practice; two of these on which I am quite clear, I will mention.

Case I. A good blue cow, which I may state had milk fever last season *after calving*, so that the owner wasted no time until I got the message.

I found the animal down, struggling violently, and ready for calving. I gave the ordinary treatment for milk fever, returned there shortly after and took away a dead calf.

I believe had I delivered the calf at first it would have been alive, but the animal was so violent, and the shed so small and bad, that I decided to wait awhile,

Case II. A red cow, down but not struggling so much as No. 1. The os quite open, but apparently no progress. This time I had a student with me who treated the milk fever while I delivered a living calf. It was afternoon next day before we got to see her again: she was then up and doing well, so too the calf, The cow didn't get up quite so soon as usual after milk fever, but this may have been caused by the remedy,

Portadown. H. C. I. KELLY, M.R.C.V.S,

ABSTRACTS FROM FOREIGN JOURNALS.

Infectious Pseudo-Rabies in the Pig.

Although pseudo-rabies was discovered in 1902 by Anjesky, and has been seen in several countries (Hungary, Russia, France, Germany, Brazil, and Roumania) it has attracted little attention from practitioners. Poenaru, Riegler, and Sachelarie, who describe the following case, believe that the disease has often been confused with true rabies by both the public and the veterinary profession. There are at least twenty cases in the literature of pseudo-rabies in the dog, cat, and ox, and von Ratz has reported it in the wild boar and in a domestic pig.

In Roumania, the disease was observed in 1914 in two dogs and two cattle. The diagnosis was established by inoculating the brains of the animals into rabbits, and the cases were recorded. The following new case occurred in November, 1919.

Poenaru was called to see a sick pig. The pig had been bought a month before in a village near Bucharest, and was confined in a small yard having no contact with strange animals. He ate well and was in good condition until the previous day. Since then he had completely ceased to eat and drink, and constantly rubbed his snout against everything he could find.

Upon clinical examination, the pig appeared very agitated. He ran constantly from one corner of the yard to the other; and on encountering any hard object, he violently rubbed the snout, lips, eyelids, or the base of the ear against it. The acute pruritis had determined self-inflicted ecchymoses and excoriations. The pruritis was confined to the head and face.

The temperature was nearly 101·5° F., and the respiration was normal. The pig did not cough. The pulse was 90 per minute, the heart-beats were very strong, and the pig showed little attention to the human voice. On the third day he continued to rub himself violently, but maxillary paralysis was not observed. The hind quarters were a little uncertain; and at ten o'clock in the morning the pig died suddenly.

The post-mortem examination was held next day. Post-mortem stains were observed upon the body, and especially upon the abdomen. The skin around the eyes, and upon the snout, lips, and ears, was swollen and showed haemorrhagic excoriations. The skin upon the right thigh was largely depilated, dark red, and swollen, and showed numerous sanguinolent excoriations, some of them deep, as if produced by barbed wire. The connective tissue, over the extent of the palm of the hand, was injected and infiltrated with serosity.

The blood of the heart was feebly coagulated. The right lung was in a conditions of hypostasis. The cranial meninges and the brain were intensely congested. Other organs showed nothing remarkable.

Bacteriological examination and cultures of the blood and organs yielded negative results. Inoculations into rabbits showed that the brain was virulent, but the blood (as sometimes happens in pseudo-rabies) was not. The authors conclude that the symptoms of the pig (pruritis and agitation without aggressiveness) and the inoculation results, are sufficient to establish the diagnosis of pseudo-rabies.—(*Archiva Veterinara*).

The Treatment of Malignant Catarrhal Fever.

Fischer, in the *Berliner Tierärztliche Wochenschritft* reports sixteen cases of this disease which was treated by injecting sterilised cow's milk in doses of 50 grammes. Subcutaneous and intramuscular injections, made after bleeding to the amount of three or five litres, have given surprising results. The comatose state of the animals rapidly improved, the appetite returned, and the symptoms disappeared in eight or ten days. In some cases the injections were repeated after three days.—(*La Clinica Veterinara.*)

W.R.C.

NATIONAL VETERINARY MEDICAL ASSOCIATION OF GREAT BRITAIN AND IRELAND.

V.M.A. of Ireland (Dublin).

Tuberculosis of the Domesticated Animals and the Public Health.

By Prof. T. G. Browne, M.R.C.V.S., Royal Veterinary College of Ireland.

(Concluded from p. 291.)

Infected Milk.

Milk and its products may contain tubercle bacilli infective for man. These organisms usually contaminate it before it is drawn from the udder, by direct passage of tubercle bacilli into it from lesions in the animal. It may, however, become contaminated after it is drawn, or during milking, by dust, fæces, or other particles of foreign matter laden with tubercle bacilli entering it. This is more likely to occur in byres which are not kept free from dust and in a sanitary condition, and where the floor's litter, as well as the quarters and udders of the cows, are soiled with infective fæces and urine, more especially if careful cleansing of the udder is not observed before milking, and if dirty milk utensils are used and the hands and dress of the milker are not properly washed. Moreover, milk is often contaminated with tubercle bacilli after it is drawn, by consumptive persons coughing or sneezing over the open milk vessels. Again, milk often acts as a carrier of certain other human infectious diseases as diphtheria, typhoid fever, scarlet fever, by becoming contaminated with the virus of these diseases from infected persons.

It is therefore evident that the milk from healthy cow, may become contaminated with tubercle bacilli as well as with the virus of certain other diseases, if it is milked in infected byres or handled on infected premises, or by diseased persons. It may also become contaminated with any of these during transit if proper precautions are not observed. Milk from a cow which is suffering from mammitis, other than the tuberculous form, may contain many virulent forms of organisms, especially streptococci and staphylococci, which may give rise to severe forms of gastro-enteritis and perhaps sore throat in man. The milk from a single cow suffering from tuberculosis of the udder may be sufficient to render a

large quantity of milk from healthy cows dangerous if mixed with it, and on this account the milk served to the public, and skim milk from creameries contains tubercle bacilli in a large proportion of cases. Mitchell examined 406 samples from milk shops in Edinburgh, and found that 20 per cent of these were capable of producing tuberculosis when inoculated into guinea-pigs. Delépine examined 7,681 samples from the milk supply of Manchester, and found 8·7 per cent. of these contained tubercle bacilli. Campbell examined 130 samples from the milk supply of Philadelphia, and found 13·8 per cent. of these contained tubercle bacilli.

Tubercle bacilli are evenly distributed in milk of a normal appearance, but if it is coagulated, watery or flaky they are most numerous in the solid particles. If the milk is allowed to stand the bacilli tend to collect in the sediment and in the cream in nearly equal proportions, but there are often more in the cream. The same thing holds good when the milk is centrifugalised.

Milk Products.

It has been conclusively proved that tubercle bacilli are sufficiently resistant to live through the souring or other processes necessary in the manufacture of butter and cheese from milk by the ordinary creamery methods. According to many investigators, butter and cheese are even a more dangerous source of infection for man than milk itself, for they are always used in the raw state, and are eaten usually two or three times daily. Moreover, they are usually transported long distances, and those who use them are seldom in a position to inform themselves about their origin, preparation and other facts which have a bearing on their freedom from infection ; hence the individual has no means of protecting himself. Again, the Bureau of Animal Industry states that in view of the fact that tubercle bacilli collect in the cream, and that the butter prepared from this cream will therefore contain the tubercle bacilli in greater concentration than the raw milk from which it was prepared, it is evident that, measure for measure, infected butter is a greater source of danger than infected milk. According to Cornet, 12·9 per cent, of samples of butter used in European countries contain tubercle bacilli. Eber examined 150 samples of butter in Leipzig, and found 12 per cent. of these contained tubercle bacilli. Other observers found that the percentage varied from 2·12 to 32·4. Hormann found that in 15 samples of cottage cheese purchased in the market three contained tubercle bacilli. Harrison tested 5 samples of cheese bought in the open market in Switzerland, and found three of these conveyed tuberculosis to guinea-pigs, and he recommended that in order that cheese may be safe, the milk from which it is prepared should be pasteurised. Most authorities now agree, however, that if cheese is allowed to ripen properly, that is, for a period of three to four months, there is little, if any, danger of infection from this source. Ice cream, condensed milk and dried milk may contain virulent tubercle bacilli, while margarine, although not a strictly dairy product, consisting as it does of vegetables and animal fats mixed with some milk, may also prove a source of infection.

Tuberculosis of the Udder.

It is obvious that in the early diagnosis of tuberculosis the udder in cows is of extreme importance in safeguarding the public health, but this condition in its early stages is extremely difficult to detect, and there is no doubt that it may exist for weeks in such a state as to render the milk dangerous before the most expert clinician could detect its presence. Its progress is usually slow and its clinical symptoms are often vague, and point to a range of possibilities which, as a rule, leave the clinician in a state of doubt as to what he is up against. Even if the animal has reacted to tuberculin it does not necessarily follow that the induration of the udder, which is usually present in these cases, is due to tuberculosis, for tuberculous cows as well as healthy ones are liable to contract mammitis of various natures. The only reliable method of diagnosis is bacteriological examination of the milk by the aid of the microscope, or the biological method, by the inoculation of guinea-pigs.

The cultivation method is almost impracticable, because tubercle bacilli are very difficult to isolate from milk by direct cultivation, since many other more luxuriantly growing organisms are always present ; and again, the tubercle bacillus being a slow grower, a period of several weeks would be required in order to obtain a culture of this organism.

The milk selected for microscopic examination should be that drawn at the middle and also at the end of the milking in order to secure the milk which is richest in tubercle bacilli, and all precautions with regard to cleanliness should be observed during drawing of the sample, so as to prevent its contamination with bacilli, some of which may be acid-fast. It is well to remember that, as a rule, the number of tubercle bacilli present is not uniform at all times, it is more numerous in the milk on certain days than on others, apparently according to the changes in the lesions of the gland. It is therefore advisable to examine several samples drawn on different days before a negative result is declared. As large a quantity as practicable of the milk is centrifugalised at a high speed for at least fifteen minutes, and a small portion of the sediment is spread as thinly as possible on three or four slides, which are then dried and stained by the Ziehl Neelsen method. The cream, although it may be as rich or even richer in bacilli than the sediment, is not so suitable for examination, because the fat globules cause the stain to run in beads on the slide and therefore prevent uniform staining. The slide after staining is examined under the oil immersion lens. If the tubercle bacilli are present only in small numbers they are very difficult to find, and are often missed altogether, even after a long search. This is most likely to be the case in market milk in which the tuberculous milk is diluted with that from healthy animals. I have often searched as long as an hour or more before being able to find a single acid-fast bacillus when examining samples of milk containing these organisms. A negative result, therefore, cannot be taken as conclusive evidence of the freedom of the sample of milk from tubercle bacilli.

On the other hand, the finding of acid-fast bacilli cannot always be accepted as furnishing conclusive evidence of the presence of tuberculosis, since other acid-fast bacilli sometimes occur in milk which are microscopically indistinguishable from tubercle bacilli. The presence of acid-fast bacilli in the milk, therefore, only furnishes very strong presumptive proof of the presence of tuberculosis in the udder, so that the clinical appearance and history of the case should also be taken into account before a positive diagnosis is arrived at. In those cases, however, where the acid-fast bacilli are numerous and the milk is thin, watery in appearance, and contains numerous flocculi which tend to collect at the bottom of the vessel, a positive diagnosis may be declared with a considerable degree of certainty.

The inoculation of guinea-pigs is the only reliable method of diagnosis, since these animals are most sensitive to the inoculation of even a very small quantity of material containing tubercle bacilli. Usually two guinea-pigs are used, and each is inoculated usually subcutaneously on the inner side of the thigh with the sediment of about 40 c.c. of the suspected centrifugalised milk. This should be done aseptically, and the milk used should be drawn from the udder with all aseptic precautions. The drawback about this method is that at least three weeks must elapse before a definite diag-

nosis can be made. It is not safe to destroy the guinea-pigs before the lapse of three weeks after inoculation, because definite lesions may not have developed sooner, especially if the number of tubercle bacilli inoculated was small. If it is desirable to conserve the guinea-pigs, those which are tuberculous may be differentiated from those which are non-tuberculous by a subcutaneous injection of crude tuberculin, 2 c.c. for each animal. As a result of this, the tuberculous guinea-pigs will die within twenty-four hours, while the others will remain unaffected,

The Production of Pure Milk Supply.

It is unnecessary to emphasise the importance of having our milk supply derived from healthy cows, and our cow-sheds and dairies kept in a perfectly sanitary condition. This calls for drastic reforms in our system of inspection of our herds and in the control and supervision of the milk supply. The work thus involved is within the domain of no other than the duly qualified veterinary surgeon, for he is the only person specially trained to carry out the examination of animals and testify for their health, and to supervise and control the hygienic condition under which animals are kept and milk is produced. It should be entirely taken out of the hands of the lay inspector, whose only qualification for the work is often that he commands sufficient public influence to procure the job. In the United Kingdom less than 50 whole-time veterinary surgeons are engaged in public health service; while it is estimated that upwards of a thousand would be required to efficiently carry out this work. It is essential that these inspectors should be whole-time officers, so that they may occupy a position of neutrality in regard to the interests of private practitioners and their clients; this is one of the recommendations of the Irish Milk Commission. It must be admitted that the present day conditions with regard to the control of the health of our dairy cows and the supervision of the production and distribution of our milk supply are in the main highly unsatisfactory. The inability of our present laws to ensure a pure milk supply is clearly recognised by those intimately acquainted with the subject, and many of these laws are not compulsory, but simply left to the free will of the different local authorities as to whether they shall be enforced or not. There is no doubt that the universal application and administration of our existing Dairies, Cowsheds and Milkshops Orders would bring about great improvement in our milk supply, but unfortunately these orders are inoperative in part or in whole of many districts, because of the laxity of the local authority. Indeed it cannot be expected that the supervision of our dairies and cowsheds under the existing conditions can be effective, for the salary offered in most casts is absolutely inadequate to compensate a competent veterinary inspector for efficiently carrying out the amount of work usually placed under his charge.

In order to ensure that legal enactments may have effective results in providing the people with a pure milk supply they must be uniformly applied, and no cow-keeper allowed to escape. It is absurd that the owner of milch cows, whether these animals are diseased or healthy, many or few, should be excluded from the scope of all legal acts and powers in connection with the milk supply, simply because he does not offer his milk for sale to the public, while at the same time this milk, perhaps rich in tubercle bacilli, is being consumed by his own family and by his servants or other employees, however many, and is also being fed to his pigs and calves—with the production of tuberculous pork and beef, which is later distributed to the public. Moreover, a herd infected with tuberculosis is always a centre of infection and a source of danger to the cattle in the district. It is therefore evident that if the community is to be properly protected and this disease eradicated from our herds, all laws relating to bovine tuberculosis and milk supply must be universally enforced; this also is one of the recommendations of the Irish Milk Commission. Herds supplying creameries and skimming stations should be subjected to particular stringent regulations, because a single infected herd, or even a single infected cow, may be the means of contaminating the entire product of a large milk station. In order to effectively tackle the problem of providing a pure milk supply we must proceed with preventive measures along two separate lines:—

1. The control and elimination of bovine tuberculosis as well as all forms of bovine mammitis.
2. The prevention of contamination of the milk, after it is drawn, with virus infective to man, chiefly tubercle bacilli.

The control of bovine tuberculosis is urgently required in the interest of agriculture, quite apart from its relationship to human disease, for the loss to the agricultural community from this disease is enormous. Since the danger of human disease from tuberculous cows can never be removed unless bovine tuberculosis is eliminated, some consideration of the methods of control of this disease is necessary. Its eradication amongst cows is admittedly an extremely difficult task owing to the insidious nature of the disease and its extremely wide prevalence.

The suggestion that all cattle in the country should be tested with tuberculin and all reactors killed, and compensation paid, is entirely impracticable, at least in this country, since owing to the large proportion of infected animals the amount of compensation required would be enormous, and the killing of at least 25 per cent. to 30 per cent. of all milch cows in the country at one sweep would cause a milk famine. All responsible veterinary authorities are agreed that measures dealing with this disease must be on selective and preventive lines, and that this will, at best, be a long and tedious business even when the problem is tackled with enthusiasm and good financial backing.

Several methods have been recommended for eradication, but that recommended by Bang, of Denmark, is the most practicable and the one most widely practised. The principle of this method is the separation of the healthy from the diseased animals and the rearing of healthy, non-infected stock. All cows suffering from udder tuberculosis and "wasters" are slaughtered; all the other animals in the herd are tested with tuberculin and the herd is then divided into two groups, one consisting of reactors and the other of healthy animals. Should any animal give a doubtful reaction it is separated from the healthy stock and re-tested after a period of six weeks. If possible one of these groups is removed to another farm, or to another shed as far apart from the original premises as possible, or failing this, as a last resource, the two groups are separated by a complete brick partition, without doorways or other openings, and separate utensils and, if possible, separate attendants are provided for each. The premises of the infected animals are systematically and thoroughly disinfected, and these animals are gradualiy disposed of to the butcher.

The next step is the rearing up of a herd free from tuberculosis. It has been shown that calves of tuberculous mothers (excepting those with tuberculosis of the uterus) are born free from tuberculosis, and will remain so if protected from infection. The calves from infected cows are removed at birth from their mothers to a place free from infection, and care is taken that no infection shall subsequently gain access to them. They are fed on pasteurised milk or milk from healthy cows. To guard against mistakes and accidents the calves after

six months old, and the whole stock of healthy animals are submitted to the tuberculin test every half-year, and should any react they are at once removed. If any new animals are introduced they are tested on two occasions, a month apart before admission. By this method a tuberculous-free herd can be reared. The initial expenses are not great, and the current expenses caused by the separation of the herd are so spread as not to be a financial burden; and again it does not cause disturbance of the milk trade. The chief difficulty and disadvantage of the method is that extra labour and great vigilance extending over several years are required to properly and completely carry it out.

A modification of this method has been tried with considerable success among herds supplying milk to Birmingham. This scheme was initiated in 1908, and only applied to herds situated within ten miles from the city. The Corporation of Birmingham supply, free of cost, tuberculin and veterinary assistance necessary for the testing of the cows twice annually. The farmer undertakes to separate the diseased from the healthy cows and to gradually get rid of all the diseased animals. Quarterly certificates of freedom from tuberculosis are given by the Corporation, and a public list is kept of farms upon which all cows are free from the disease. This scheme has met expectations, and although it was inevitably suspended during the war there are still twenty tubercle-free herds. It was proved that the disease could be eradicated with ease from a herd in six years, although some of the farmers were able to clear their herds in less than two years. According to Mr. Malcolm, the chief veterinary officer in charge, the problem is immensely simplified when the cows are all bred at home, and the chief difficulty to be overcome is the introduction into the herd of new infected animals which temporarily *do not react* to tuberculin either because they are only very recently infected or for some other unknown reason. The progress of this scheme before the war was so satisfactory that the medical officer of health then stated: "There is now in Birmingham a recognised supply of tubercle-free milk the product of tubercle-free cows, and the demand for such milk appears to be spreading, particularly in the better-class districts."

It is evident that the control and eradication of bovine tuberculosis is impossible of achievement without the co-operation of the veterinarians, the legislators, the live-stock owners, and the public generally. In order to secure the co-operation of the public and live-stock owners it will doubtless be necessary in most communities to carry out an active and prolonged educational campaign. This may be accomplished by means of bulletins, lectures and actual demonstrations, all setting out in as simple a form as possible the cause and character of tuberculosis among animals; its modes of dissemination, and its significance as an economic and a public health problem. It would be a decided advantage if at the beginning of this campaign a few farmers in each district could be got to take the initiative, and eradicate the disease from their herds as quickly as possible and produce only tubercle-free milk. The consumer could then be educated up to the appreciation of the value of such a supply, and would doubtless soon be prepared to pay a little more for such milk.

So long as the milk consumer is uneducated as to the danger of an impure milk supply, so long will he continue to patronise the dairy farmer who supplies the cheapest milk irrespective of the conditions under which it was produced. Once the consumer is prepared to patronise the dairy farmer known to have a healthy herd, and to pay a little more for milk guaranteed pure, it would then be possible to periodically and publicly grade the dairy farmers according to the quality and health of their cows, and to the hygienic conditions under which the milk is produced. The maximum price of the milk could then be fixed according to the grade; that of the third grade being, say, twenty per cent. under that of the first. There would thus be a great stimulus for every farmer not in the highest grade to improve his herd and other conditions for the supply of milk in order to get up to this grade, and thus procure the highest price for his produce.

According to the recent final report of the Astor Milk Committee, there is of latter years an apparent increased demand on the part of the public for clean milk, accompanied by willingness to pay a higher price for milk of a guaranteed quality, and this Committee is of opinion that a scheme which provides for:—(1) official veterinary assistance in the work of diagnosis and eradication; (2) the periodic issue of certificates in regard to herds, and (3) co-relation with a system of milk grading which would provide an official guarantee on which the milk producer could base his claim to receive a better price for a better article—would be welcomed by progressive farmers, and would contribute very materially towards the eradication of tuberculosis.

In America greater attention has been directed towards the improvement of the milk supply than in most other countries, and to this end several methods of control have been there originated which have proved of great value and which are worthy of consideration and imitation in this country. The method which seems to have been most successful, and which is likely to be most practicable in this country is the so-called "Score-card System." This is a system of publicly recording the results of the dairy and cow-shed inspections. The inspector keeps a score-card for each farmer under his supervision. This card is arranged with two separate columns, one headed "Equipment" and the other "Methods," and a total of 40 and 60 marks respectively are allowed for each—100 marks in all. Under "Equipment" are included the cows, cow-sheds, utensils and milk-rooms. The highest number of marks is given for the good health and condition of the cows, and a smaller number for each of the others—the construction and situation of the byres and milk-rooms, and the construction and suitability of the utensils. Under "Methods" are included the cleanliness of the cows, byres, milk-rooms, utensils, the hands and suits of the milkers, as well as cleanliness and care during milking. These scores are published periodically in the local newspapers and are keenly discussed, and they stimulate the rivalry of the farmers. It is said that the prospect of scoring more marks will induce a farmer to improve his herd, to keep his cows clean, and attend to other details more effectively than discussions on bacterial content or other apparently technical points.

The following advantages are given for this system:—(1) It stimulates improvement by voluntary enterprise and without resort to coercion; (2) it provides the health officer with an accurate and convenient record of his dairies; (3) it assists the consumer and milk dealer in locating the better dairies; (4) it serves as a check upon the work of the inspectors; (5) by publication of the scores at intervals every dairy farmer is given credit for every effort he has made to produce pure milk. The adoption in America of the principle of grading has resulted in a great improvement in the general milk supply and has not prevented the poorer classes from obtaining milk. In the city of New York the system of grading according to cleanliness and purity has stood the test of experience for many years, for when the system was inaugurated 40 per cent. of the city's supply fell within the definition of the lowest grade—Grade C.—but at the present time one-seventh of the total supply is Grade A., six-sevenths Grade B., and there is no longer any demand for Grade C.

It is true that in this country milk from good and bad

dairy farmers all sells for practically the same price, but publication of the results of inspection and education of the consumer will go a long way towards correcting this state of affairs. There is no doubt that enforcement of the proper procedures in regard to the milk supply would at first cause the retail price of milk to go up a little, but this would only be temporary, and the price would fall again when it is found that the requirements are not costly in themselves, but essentially matters of education and elimination of bad habits and practices. That this fall in price is likely to occur is shown by the fact that to-day there are a certain number of milk producers who produce their milk under admirable conditions and can make as good profits as their less conscientious rivals.

The live-stock owner should receive some encouragement in the eradication of tuberculosis from his herd in the way of State aid, chiefly free tuberculin and free veterinary assistance. He should also receive full compensation for all tuberculous cattle slaughtered during the first three or four years of the campaign; but after that he should be fined if any animals with advanced tuberculosis are found in his possesion, for by this time he has had ample opportunity for getting rid of all clinically affected animals. In order that our efforts in this anti-tuberculosis campaign may be attended with success legislation is necessary, involving comprehensive and disciplinary control of the health of all our live-stock. Our last Tuberculosis Order of 1914, which was suspended during the war, is certainly a step in the right direction, and will no doubt be the means of reducing the amount of tuberculosis in the country if properly carried out, but it cannot of itself be the means of completely eradicating this disease from our herds, since it only aims at getting rid of all clinically affected animals and animals suffering from tuberculosis of the udder, and does not in any way provide for testing with tuberculin or the isolation of all the diseased from the healthy animals. In fact, we can only claim to be within sight of success when we have reached that stage in the campaign at which it will be possible to have all the animals in our herds proved healthy or otherwise by compulsory testing with tuberculin at least twice a year, and to have all our dairies and cow-sheds subjected to compulsory inspection at stated intervals.

Prevention of Contamination of Milk after it is Drawn.

In order to effect this it is necessary to pay attention to the hygenic conditions and those points of cleanliness already referred to in connection with cow-sheds, dairies, cows, milkers and utensils. To ensure that this is carried out there must be strict supervision and control of the sanitary conditions of all cow-sheds and dairies, and of the handling of the milk during the milking process and until it is distributed to the consumer. Any person suffering from any dangerous infectious disease, or anyone who has recently been in contact with such a person, should not be allowed to come into contact with or handle milk or milk vessels.

Control of Meat Supply.

Several diseases may be transmitted from animals to man through the meat supply, but the most important of these is tuberculosis. Those less frequently transmitted in this way are anthrax, trichinosis, certain forms of tape worms, and possibly actinomycosis. As already stated, tuberculosis is very common in the ox and pig, and may be transmitted to man by the consumption of the meat from these animals, although not so commonly as by the ingestion of dairy products.

Some authors believe that the danger of acquiring tuberculosis from meat is not very great, chiefly because meat is only eaten after being cooked, and also because if extensively infected the condition can be easily recognised, so that meat in this condition is not likely to be put on the market. That the danger of infection through the meat supply cannot be ignored is shown by the fact that it has been proved that the interior temperature of even a moderate sized joint during cooking is often not sufficient to destroy tubercle bacilli, although those on the outside and for some distance from the exterior are always destroyed. It should not be forgotten that many of the prepared meat foods, such as brawn, meat pies, sausages, etc., are also a source of danger in this respect, because the degree of heat reached in the preparation of such foods is often not high enough to sterilise the central parts. Moreover, there is a temptation to compound such foods from meat of doubtful quality, the makers trusting to the alterations which take place in preparation to render its detection difficult, and thus disguise its inferiority.

The danger attending the consumption of meat or its products from tuberculous animals may be entirely overcome by a general system of obligatory meat inspection. It is surprising that the United Kingdom, which is said to be very well organised with regard to public sanitation, is still without a regular meat inspection system, while the United States, Germany, Belgium, France, Spain, Italy, and several other European countries are much further advanced in this respect. In Germany, before the war, meat inspection was organised and regulated by Imperial Law, and 1,180 veterinary surgeons were engaged in this work—more than one third of the total number on the Register of the R.C.V.S. The United States has a general organised system of meat inspection authorised by an Act of Congress, June 1906, and upwards of a thousand veterinary surgeons are engaged in this work. In France, also, before the war this work was well advanced.

In order that a proper system of meat inspection may be uniformly and effectively carried out it is obvious that the first step towards success must be the elimination of all private slaughter-houses. This private slaughter-house system is the one at present in existence in most of the cities and towns in the United Kingdom, with few exceptions, so that very drastic reforms are necessary before a proper system of meat inspection can be guaranteed. It is almost impossible to efficiently supervise slaughtering at a number of small isolated establishments each killing only a few animals, a day, or perhaps slaughtering only once or twice or three times a week, and this may be done at any time of the day or night. It would therefore necessitate the employment of a small army of inspectors to provide a sufficient number so that one should be present at each and at all times. It is largely on account of the multiplicity of slaughter-houses that thorough systems of meat inspection have not been more generally established. To meet the first requirement there should be competent veterinary inspection of all animals immediately before and at the time of slaughter, or in cases where inspection at the time of slaughter is impracticable, the inspection may be performed later if certain viscera are retained with the carcase. It is therefore obvious that concentration of slaughtering for each community into one place is desirable. There should be public slaughter-houses under either municipal or private ownership, and in either case under official supervision, and all slaughtering should be required to be done there. It is preferable for each town to own an abattoir, but where this is not practicable the next best plan is to have a central public abattoir owned by private enterprise, but, of course, under an official inspection system. In these public establishments a certain sum per head could be charged for killing in case the entire operations were carried on by the management of the abattoir, or the butchers could be

permitted to bring their stock to the abattoir and do the work themselves by paying a certain sum per animal for this privilege. One inspector could inspect the abattoirs of several neighbouring towns by arranging the times and days of slaughter, so that he could cover all places satisfactorily. In Germany there are inspectors who cover several towns in this way, known as ambulatory inspectors.

Animals killed privately on the farm and brought directly to the town for sale present a difficulty which may be fairly well met by requiring that they must have certain viscera attached, and be brought to a certain place for inspection. This public slaughter-house system is to be commended not only because it facilitates the inspection of meat, but because of the numerous other advantages which it presents. It would give the small butchers all the advantages enjoyed by the larger ones, as they could use the machinery installed and all the increased facilities supplied. Instead of increasing the cost this system would have a tendency to reduce it, for a large establishment conducted by co-operation among butchers would obviously entail less expense than a number of small ones. There would be an opportunity to obtain revenue from products which are usually wasted at small establishments, and this, according to Mr. J. S. Lloyd, of Sheffield, is no negligible quantity. Besides being a safeguard to the consumer of meat this system is more convenient and cheaper for the butchers, and subjects them to no hardships whatever. Moreover, this system would eliminate all small, poorly built, badly managed slaughter-houses, which are in many instances nuisances in their respective neighbourhoods and prolific sources for the spread of disease. Frequently the offal from such establishments is thrown aside to decay or be devoured by dogs, cats, pigs and rats, which often become infected as a result, and through them infection may be transmitted to other animals and to man. Not only tuberculosis, but trichinosis and certain forms of tape worms may be disseminated in this way.

Our meat inspection system, where it exists at all, does not, in most cases, provide for inspection of carcases at time of slaughter, but merely provides that an inspector, not necessarily with any special qualifications for the work, may at any reasonable time examine any carcase or meat which is to be sold for human food. This, of course, is not meat inspection in the modern sense of the term. Although this system is doubtless of considerable value and may result in condemning large quantities of diseased meat, it cannot be nearly so effective as competent veterinary inspection of carcases at the time of slaughter, for not even a skilled inspector could always detect disease in meat after it has been dressed and the viscera disposed of.

All condemned carcases and their viscera should be carefully destroyed, or they may be utilised after sterilisation for the production of tallow and poultry, pig, and dog foods, as recently recommended by Lloyd. All meat which has passed as fit for human food should be graded and stamped according to its quality, so that the consumer may be guided as to what he is purchasing. When a carcase is condemned as being unfit for human food on account of being tuberculous, the producer should suffer the loss rather than the butcher, for in many cases it is only where the producer begins to realise his financial loss that he is stimulated to take steps for the eradication of tuberculosis from his herd. It is more advisable, however, that the State should bear the greater part of the loss in the earlier part of an anti-tuberculosis campaign, in order to minimise the motive for concealing tuberculous carcases. Hitherto there has been no legal definition of what constitutes generalised tuberculosis, and no laws stipulated to guide a meat inspector as to when the whole of a tuberculous carcase, or only a part of it, should be condemned as unfit for human food. This objection, however, has now been removed by the Tuberculosis Order, which follows the recommendations of the Royal Commission on Tuberculosis. These recommendations are :—

"(*a*) The entire carcase and all its organs must be seized :—

1. When there is miliary tuberculosis of both lungs.
2. When tuberculous lesions are present in the pleuræ and peritoneum.
3. When tuberculous lesions are present in the muscular system, or in the lymphatic glands embedded in or between the muscles.
4. When tuberculous lesions exist in any part of an emaciated carcase.

(*b*) The entire carcase should not be condemned, but every part of it containing tuberculous lesions should be seized :—

1. When the lesions are confined to the liver.
2. When the lesions are confined to the pharyngeal lymphatic glands.
3. When the lesions are confined to the lungs and thoracic lymphatic glands.
4. When the lesions are confined to any combination of the foregoing, but are collectively small in extent.

In the pig the presence of tubercular deposit in any degree should involve seizure of the whole carcase and its organs, in view of the greater tendency of generalisation of tuberculosis in that animal.

In respect of foreign meat, seizure should ensue in every case where the pleuræ have been 'stripped.'"

The CHAIRMAN said the paper was a most interesting one, but the enormous possibilities of acquiring tuberculosis made him an anti-prohibitionist for life ; and before long he would be afraid to drink milk.

Mr. HOLLAND complimented Prof. Browne on the great care bestowed in the preparation of his excellent paper ; and said I would just mention the case of a cow reported to me in 1913 as suffering from tuberculosis. The emaciated appearance and chronic cough certainly pointed strongly to that disease. There was however an absence of a peculiar sharp cocking of the ears which I have frequently observed in cattle extensively so affected. She reacted regularly to the tuberculin test, and yet post-mortem proved that the trouble had been the result of hoose.

In reply to questions by Mr. Magee :—She may have had at least three calves, it was a unique case in my experience. I failed to find any sign of tuberculosis after a careful search.

Mr. DUNLOP said he considered Prof. Browne's paper one of the most comprehensive and concise he had read. It was 25 years since he retired from active practice, and he never had an opportunity of employing the tuberculin test. They often heard it said that tuberculosis was not hereditary because no calf was ever born with the actual disease, except in rare cases where the uterus was affected. The uterus is a most efficient shield for protecting the fœtus from tubercle bacilli. We have been trying for years to eradicate tuberculosis in cattle by isolation, but so far we have made little headway. We must attack the disease from every standpoint. We must breed from healthy stock — cattle which have been proved capable of resisting the disease under ordinary conditions. Medical men are unanimous in their opinion that tuberculosis runs in families. A doctor acting for an insurance company always makes a point of enquiring into the family history of the would-be insurer.

Prof. CRAIG said this was the first paper Prof. Browne had presented for discussion before this Association, and he hoped it was the forerunner of many others. He has

given in the paper before them a very good *resumé* of the facts as they are known bearing upon the necessity for action against bovine tuberculosis from the Public Health point of view. The statistics which had been prepared to indicate the proportion of tuberculosis in the human subject of bovine origin pointed to what might be regarded as an alarming state of affairs, and one which was lamentable because with due precautions the infection could be avoided. The day has gone when the tranmissibility of the disease to the human subject is questioned, and our present knowledge on that point is due to the stimulus which was given to investigation into the matter at the International Congress held in London in 1901. At the present time, by cultivation and by biological experiment it is usually possible to decide the source of tuberculous infection in the human subject, and from the unceasing labours of careful investigators a mass of information has accumulated which is proving of the greatest service in demonstrating the necessity of controlling bovine tuberculosis. It is apparent now that there is no disease of animal origin which takes such a large toll of the human population. In saying this, he did not wish to suggest the misleading inference that human tuberculosis largely resulted from infection by the bovine. One must always keep in mind that the great bulk of the disease in the human subject has a human derivation, and that any action taken against bovines will have only a subsidiary function in lessening the disease in man. But although that is the case, there can be no doubt that such action is not only warranted but necessary.

From the statistics available, it would appear that young children and young people under 10 years of age were the chief sufferers from infection by the bovine type of the tubercle bacillus. This fact points to the use of raw cow's milk as the common carrier in these cases. Cow's milk would appear to be the most potent source of infection of the human subject with animal tuberculosis. And in that connection it was certainly alarming when one came to realise the large proportion of samples of milk taken in various cities in the British Isles which contained tubercle bacilli. These bacilli were derived from the tuberculous cow, and the contamination of the milk occurred not only before, but also after the milk was withdrawn from the udder. In the former cases the udder was frequently affected with tubercular mastitis, but in some instances it had been shown that tubercle bacilli were excreted in the milk although there was no apparent lesions in the udder. This chiefly occurred, as was shown by the last Royal Commission, in cows which were showing clinical symptoms of the disease.

It is a matter for regret that so far as Ireland is concerned there are no reliable statistics available as to the prevalence of bovine tuberculosis. There is no doubt that the disease is common in bovines, but it is not possible at the present time to form a more or less exact idea of its frequency in Ireland. There are two sources from which that information can be derived. From public abattoirs one would obtain the reports of the number of animals slaughtered and the numbers affected with tuberculosis. Such reports are not available because of the want of systematic meat inspection in the country. In addition to that no reports have been published which give the results of the application of the tuberculin test to a number of herds of cattle or large numbers of bovines. Statistics of this nature are very valnable, and there is no good reason why they should not be at hand. At the present time their ideas as to the prevalence of tuberculosis in cattle depend not upon what was done in this country, but upon the reports gathereed in Great Britain and elsewhere. That is not as it should be. They should be able to stand on their own legs by this time. The defect could easily be corrected by systematic meat inspection and control of tuberculin. Tuberculin is sold in a promiscous fashion. It is not always evident whence it comes, whither it goes, or what it is used for. The statistics compiled in connection with the Tuberculosis Order of 1913 were not of much service in giving any indication as to the prevalence of the disease at all.

On the examination of tuberculous lesions and discharges, an interesting feature was the great variation in the numbers of tubercle bacilli that could be detected under the microscope. This was often noted in the examination of tuberculous milk. Only occasionally, and then always in advanced cases of tubercular mastits, were tubercle bacilli present in great numbers. One case of the kind he had met lately in which the organisms were as numerous as he had found in any lesions, and cultures were easily obtained direct from the material. That was an exceptional case. It is as a rule difficult to find them, and in the examination of milk when one could not find them one could not say that they were not present.

On the question of heredity he was unable to follow Mr. Dunlop at all well. Mr. Dunlop appears to contend that before an animal became affected with tuberculosis it must be particularly susceptible, and that particular susceptibility was inherited or transmitted from parent to offspring. As opposed to that view it must be stated that there is no evidence to show that an animal will escape infection when it has been properly exposed. The only effective means of eradicating the disease among cattle consists in getting rid of the affected animals and removing the source of infection.

Regarding the effects of the Tuberculosis Orders of 1913 and 1914 upon the incidence of the disease among cattle, it was not to be expected that its prevalence would be materially reduced. They might reduce the frequency of clinical cases in our herds. One has to remember that these Orders were conceived and introduced to control the disease from the Public Health point of view, and to prevent infection of the human subject through the milk and milk products. It was, however, quite within bounds of probability that if the Orders were carried out in an efficient manner the time would come when more drastie action would be taken against bovine tuberculosis, but it seemed to him, considering the prevalence of the disease and the difficulties surrounding the question, that time was yet a long way off. Nevertheless he thought that the people of the country when better educated to the danger of infection from the bovine, would look with favour upon the herds from which by individual effort the disease had been eradicated. At the present moment the public paid more attention to cheapness and a plentiful supply of milk than to its freedom from tubercle bacilli. It was to be hoped that the time would soon come when people would appreciate milk from a tubercle free herd, and would be prepared to pay an enhanced price for it. Until then it was hardly likely that the initiative would be commonly taken by individual owners to free their herd of the disease. They as members of the profession were prepared to support and encourage as far as in them lay efforts of this nature, which should act not only as safeguards to the public but as profitable propositions to the owners of dairy herds. Their influence should be brought to bear whenever possible in favour of such objects upon those who were directly or indirectly concerned in this important question.

Mr. DUNLOP was afraid Prof. Craig misunderstood him altogether. Few will dispute the fact that pedigree cattle are more subject to tuberculosis than native Irish breeds. It is well known that Ayrshire cattle and Shorthorns are more prone to the disease than Hereford and West Highland, that is to say when all other conditions —housing and feeding—are practically the same. There

would be no sense in comparing different breeds of cattle as to their susceptibility to tuberculosis if other conditions were dissimilar. It would be absurd to compare individual cows if one were housed in a badly ventilated cowshed and the other at grass.

The Department supplied a quantity of pure milk to the Dublin Corporation, but we are not told what became of the reactors. The ordinary dairy herd-keeper could not afford to sell his reacting milch cows right off at the butcher's price. The usual practice was to send them to the market to find their way to the poor man's dairy and further contaminate his herd. The housing of dairy cattle is often at fault. The cows are not partitioned at their heads, and the result is they cough over each others food.

Our children are very much in excess of the proportion in other places. They knew the Edinburgh people had been breeding for deep milkers and had neglected to breed for a disease-resisting stock.

Mr. NORRIS said he would like to touch on a question or two raised by Mr. Dunlop. The latter appeared to think that there were herds around Dublin from which tuberculous cows were turned out and found their way into the poor man's dairy.

Mr. DUNLOP: I did not say so. I said that was the usual practice and I have no information beyond that.

Mr. NORRIS: We will take it as the usual practice then. Continuing, he said Mr. Dunlop further said no person in the Association ever raised his voice against this vile practice. As a matter of fact, for the last six or seven years, with the exception of three years during the war, there had been an Order in force dealing with these animals, and they should not find their way out of any herd into another herd. Prof. Craig raised a very important point—the fact that a perfectly normal udder, so far as clinical examination goes, might shed tubercle bacilli in the milk. He was afraid that must be taken as a fact. From a pathological point of view they might safely say that in most cases they would expect that before a lesion in the udder spreads to the extent that it becomes a clinical symptom, a few bacilli, might from a microscopic lesion, pass into the milk. He agreed with what Prof. Craig said, and what probably everyone else thought, that microscopic examination of milk is not very satisfactory. Even when they made an exhaustive negative examination, it was not definite evidence that there was no tuberculosis. He did not think microscopic examanation of discharges was very important from the practitioner's point of view, because he had the tuberculin and other clinical tests to aid him in a diagnosis. He did not think the practice of examining sputum or fæces was a very practical or helpful one. Any statistics they had in Ireland were not very reliable, and did not cover the whole ground. There was no indication of the extent to which the herds of the country were infected. He congratulated Prof. Browne on his paper and agreed with everything he said in the opening chapters, especially that the veterinary surgeon should take his proper stand on this question of the public health. He did not think Prof. Browne was right in stating that Koch first thought bovine and human tuberculosis were two different things. He thought Koch thought they were one and the same thing, and that it was 20 years afterwards he put forward a different theory, and 20 years afterwards that the world showed him he was wrong absolutely. Prof. Browne made an important statement, that the eradication of tuberculosis as a commercial problem was well worth the candle, and he (Mr. Norris) thought that was really their greatest task—to clear tuberculosis as far as possible out of their herds. He agreed with everything Prof. Craig said in regard to the Tuberculosis Order at present in force. It simply removed clinical cases; had no policy of prevention, and until they had the broader policy of prevention the Tuberculosis Order would never completely eradicate the disease. He had often thought it was more or less futile for dairy farmers or government departments to encourage the grading up of the milk yield of a herd and not, at the same time, try to weed out and free a herd of tuberculosis and abortion. A man might have a most excellent herd of milkers, but if they were infected with tuberculosis and abortion he was still in a very bad way. The unfortunate part about it is that people will not pay more for milk from a tuberculosis-free herd, and would not pay more for store cattle from a free herd. The great difficulty about freeing the herds was the length of time, and the disappointments that took place during the efforts. Even the Danish farmers, who were well known for their industry, sometimes got sick of it when half way through.

Mr. DOLAN said grazing land was a great medium of infection. His experience of dairy sheds was that they were generally in a damp and wet condition and thus prevented infection by inhalation. He thought infection in dairy sheds was by ingestion. Cattle were tied to the wall; they coughed; the sputum stuck to the wall and it was only when the wall dried that dust arose and infected the other animals. The usual method of infection was that an affected animal coughed on to or contaminated by fæces the food of the other animals. Prof. Browne said that from 1 to 2 per cent. of cows suffered from tuberculosis of the udder. He (Mr. Dolan) thought that was far too high. The highest he ever heard of was 2 per cent.—milch cows as well as dry cows, and he thought ·4 per cent. of all milch cows would be nearer the average. Prof. Browne stated that the percentage was smaller in Dublin than in Great Britain. That would be accounted for by the fact that the Dublin dairymen changed their stock every season.

The question of milk products was important, and there was little attention paid to it. One of these was also margarine, which might be, to the human subject, a very big source of infection from the fat used in its manufacture. With regard to Prof. Browne's statement as regards taking a sample of milk—that the strippings should be taken, he did not altogether agree. It would all depend on the situation of the lesion in the udder. A wide necked bottle should not be used for taking samples; personally he used a narrow necked one and held the bottle on a slant when taking the sample. Prof. Browne also stated that clinical symptoms of a tuberculous udder were vague, and pointed to a range of possibilities which as a rule left the clinician in a state of doubt as to what he was up against. He did not agree with Mr. Browne in this. It was as easy to give an opinion on tuberculosis of the udder as to give an opinion on a mangy horse without the aid of a microscope; or to give an opinion on whether a cow had tuberculosis of the lungs or not. Under the Tuberculosis Order, they were not allowed to use the tuberculin test when finding whether a cow had tuberculosis of the lungs or not. It was only in cases of emaciation, or tuberculosis of the udder, or suspecting the animal of giving tuberculous milk, that they were allowed to apply the tuberculin test.

Mr. NORRIS: You can use the tuberculin test any time you like.

Mr. DOLAN: No. Only in the conditions I have mentioned.

Prof. CRAIG: Would not the last consideration bring the case within the category in which it could be subjected to the test—that the milk was suspected?

Mr. DOLAN said that would not affect a bullock suspected of having tuberculosis of the lungs. As regards meat inspection, Prof. Browne gave the recommendations of the Royal Commission. He (Mr. Dolan) thought the Royal Commission on tuberculosis showed a lack of knowledge of the disease. For instance, he thought

their recommendation that the entire carcases should be destroyed when tuberculosis existed in any part of emaciated carcases was wrong. Often store cattle are in an emaciated condition from under-feeding, and if they are slaughtered as the result of an accident, and on inspection a small lesion of tuberculosis is found in the lung, was that animal to be condemned on account of tuberculosis? Take a milch cow that breaks her leg and is slaughtered. She may be in an emaciated condition; is she to be condemned if otherwise healthy, because there was a small lesion in one of the lungs or other part? In conclusion he said he thought tuberculosis as regards meat inspection should be considered from the following points—tuberculosis of the serous membrane; tuberculosis of the organs; tuberculosis in the lymphatic glands, and tuberculosis of bone.

Mr. HOWARD said he would like to have a good deal more attention paid as regards public health from the veterinary point of view. As regards Mr. Browne's remarks about the necessity for an educational campaign, that was a matter which to his (Mr. Howard's) mind had been sadly neglected, and as a first step he would recommend that this paper by Prof. Browne should be published broadcast in the press. They had not done their part in endeavouring to educate the public on the importance of this matter. They should endeavour to get the public to appreciate what they could do in connection with the prevention of the spread of tuberculosis among animals and, as a consequence, among mankind. The Irish people knew that their paternal government did not care very much about public health in this country. They as Irishmen and as veterinarians ought to be proud of their live-stock and do everything to promote and maintain the health of their stock. One of the the things that must be done was to educate the public, and the most important thing in that connection was to teach them how to prevent the spread of the disease. If they could prevent the spread of the disease in animals they could prevent it in their human population. The disease was spread principally by the fashion in which the milch cows were kept, and the milk supply obtained and handled. Anyone going around the country would be able to find sufficient evidence that they were by no means careful as to cleanliness. They should give attention to the importance of keeping cows clean. There was, to his mind, too much importance attached to the question of finding bacilli, and too much attention paid to finding tuberculosis of the udder. All statistics went to show that tuberculosis of the udder occurred in one to three per cent. of affected cows, and that was not of very much importance when they came to think of the enormous population of milch cows. Scientific men admitted that an animal affected with tuberculosis in any degree was liable at all times to emit tubercle bacilli in the faeces. The milk too often became contaminated with the faeces, and there was the secret of how tuberculosis was introduced into milk in a good many cases. They should endeavour to get something done in the way of keeping cattle clean; and if the stalls were made the proper length so that the cows could not be down on the manure it would go a long way towards keeping them clean. If the hind quarters and the udders were kept clean it would do away with 90 per cent. of the trouble. He agreed with Prof. Craig that there should be proper control of the supply of tuberculin.

Mr. KELLY—I regret I have not been able to do more than to glance superficially over this paper. I have much pleasure however in congratulating Prof. Browne on his very admirable effort. The paper is constructive and suggestive to a degree; it gives evidence of much care in preparation, and has the further merit of being clearly expressed. As far as I am aware this is the first contribution the Professor has made to the literature on this much discussed subject. His effort is worthy of the occasion—of the seriousness of the question he has attempted to handle.

I am afraid however he will suffer the same fate, as those who have gone before him and in all probability of those who will come after him. His voice will be like the voice of an infant crying in the night.

He may support himself in the future with the melancholy reflection that this Association watched at his intellectual cradle, and presided at his obsequies on one and the same night. He may be assured he will find himself and his work decently interred in the columns of the professional journals, without even the hope of resurrection except by the hands of some medical officer of health on the make, or an unqualified assistant, looking for inspiration.

At the close of the war, when the powerful German Empire had melted away and was in the dust, and the country in the hands of revolutionaries, I remember the efforts that were made to build up some stable form of government. I was particulary struck, in reading down the list of its first ministers, to find that although society was in the melting pot they had not forgotten to put in a Minister of Fine Arts.

I could not help thinking how little England, with all her wealth and influence, had done or cared for either Science or the Arts, when all the other countries in the world were calling around them the best brains their country could yield, and supporting and encouraging them by every means in their power. Science and Research in England were starved out of existence, and the Arts permitted to sicken and die. She was content to remain the fruitful mother of loud voiced political stunt-hunters, while the standard of mental efficiency was either neglected or ignored.

Lord Rosebery once said a country gets the government it deserves. If that be true, the English people have no cause for complaint.

If the Professor is sanguine enough to suppose that the cow-keepers and milk interests of this Kingdom are going to put themselves to the expense and trouble of reconstructing their byres, and freeing their herds from this most insidious disease, and set about generally mopping up the mess of ages in order that they may be enabled to sell their milk for a couple of pence more in the gallon, I am afraid he is asking too much. If his optimism carries him this far, he deserves to he decorated with an Iron Cross. If I am not mistaken (and I am open to correction) I think any time before the War, it was estimated that the Government by the judicious expenditure of a million-and-a-quarter of money an absolutely tuberculosis-free herd of cattle could be produced in the United Kingdom. I venture to say if any man were to stand up in his place in the British House of Commons in 1913 and propose that this sum be voted and set aside for this purpose, it would at once be considered advisable to call in a mental specialist to examine him, and at the same time to prepare a padded room in Bedlam for his immediate reception. Yet a few days ago, in the heel of a dull afternoon, in an almost empty house, five hundred millions of public money was voted away without a word of discussion, for the purpose of helping Winston Churchill to take the British Army on an excursion to Petrograd this winter. The Ministerial mind is a strange and complex piece of mechanism, its inner working surpasses all understanding, its light shines neither on land or sea. Whenever reform is attempted, especially social reform, they always begin to build at the top, and the usual procedure is to employ a mob of hungry officials to hold up the roof, while somebody else puts in the foundation.

The present body of unscrupulous wise men, who by an act of courtesy we call a Government, has added much to the gaiety of the nations.

The people of Ireland are rocking with laughter at their escapades. They have neither sense nor sense of humour. Whether they are engaged in a "hang the Kaiser, and search his pockets election" or sending the British Fleet to fish for an Irish Archbishop in mid-Atlantic, they are always equally entertaining; any old wheeze at all is good enough to lift the flood gates of the British Treasury, and pour out public money to justify it. It takes as much money to facilitate a Lloyd Georgian stunt, as would float a new Merchant Marine, and as far as the British public are concerned it's all in the day's work; they poor devils can stomach anything if only the proper atmosphere is created.

When the Germanised National Insurance Act was in course of preparation we were promised a new heaven and a new earth, we were to get ninepence for fourpence, and to lend enchantment to the view, the landscape was to be dotted over with sanatoria, and our imaginations were fired to the highest pitch about it. We are still waiting for its accomplishment. All the curative measures were to be adopted, while the source of the disease, the old tuberculous cow still lies festering in her byre—and is likely to remain there undisturbed. The only real concession the respectable taxpayer has got is to have the "unmarried mothers" hitched on to the benefits of the Act, and handed over to his tender embraces. Pretty name, "unmarried mothers"! There is a subtle delicacy and romantic touch about this that can't fail to make a strong appeal to "the man in the street." I saw by the *Daily News* the other day, that there is a syndicate in course of preparation in England controlling four-and-a-half millions of money, for the purpose of swallowing up all other smaller milk interests in the country. Let us hope they won't mix their milk as they mixed their politics. Honesty of purpose, miert, and real enthusiasm for the work in hand are qualifications that should be nursed tenderly on account of their rarity, and encouraged in the fullest measure. I hope that the work and the voice of Prof. Browne may penetrate beyond the walls of this Association.

Mr. HEALY said he did not think the veterinary profession had been slack in their duty as regards education. If the Government would advance money it would be easy to rid the country of tuberculosis. The State should assist people and give them facilities for raising tuberculosis-free stock.

Capt. WINTER said he did not believe any one breed of cattle was more immune from tuberculosis than another. It was a question of the way they were kept. They used to say that Kerry cows and goats were immune, but that was all nonsense. Little could be done by isolated effort. They wanted concerted action and State-aided action. He agreed with Mr. Healy, that tuberculosis could be stamped out of bovines in this country. He did not agree with Mr. Howard that they had done nothing. *They had done a lot.* They had to do everything for themselves. This was a question for the State first and then for the individual. They should carry on propaganda, and this paper should be circulated. Isolated effort was very little use. It was no use getting the disease out of half-a-dozen herds in a parish. There was no use having cows in Dublin immune if the cows in the country, whose milk was coming here, were affected. He had condemned carcases which were taken out and sold to the public. What he condemned was intended for sausages—it was not good enough for sausages but it was good enough for the poor people. That was a crime.

He thought the source of infection was mostly ingestion. They all ingested in their lives millions of bacilli. They were able to throw them off because they were healthy, but if they were run down the bacilli got hold; and it was the same with cattle.

REPLY.

Prof. BROWNE thanked the speakers for the generous way they treated his paper. When writing it he had two chief objects in view; one was to make it as interesting and instructive as he could, and the other was to give as much scope for discussion as possible. As regards the latter object he was satisfied that he had achieved a considerable amount of success, though he had a mixed feeling of pleasure and disappointment that more of the statements—especially some in the latter part of the paper, were not challenged and criticised, and something perhaps of a more practical nature suggested.

He had been almost certain the question would have been asked "are these suggestions in the paper with regard to the eradication of tuberculosis and the control of the milk and meat supply, at all practicable?" To answer this himself, he would say that at the present time, and at our present stage of progress, it would not be practicable to put all these recommendations into operation at one sweep. The process would have to be a gradual one; all these different stipulations could only be brought into operation step by step, and it was only when they had reached a certain stage, and achieved a considerable amount of success in the campaign, that all the recommendations could be put into operation in their entirety. With regard to the eradication of tuberculosis from our herds, there were two chief factors to be overcome, one was the lack of any immediate prospect of return to the farmer for the trouble and expense involved in the process; the other was the lack of facilities for maintaining the separation of the diseased from the healthy animals. He did not think that at the present time there was any great stimulus for a farmer to eradicate tuberculosis from his herd. To the ordinary individual farmer it appeared easier, and even more economical for him to go on in his usual way, even suffering considerable financial loss yearly, than to take any immediate steps involving a large amount of trouble and some expense to eradicate the disease. In the present state of affairs in this respect a farmer who takes steps to eradicate tuberculosis from his herd has no great prospect that he will receive a higher price for his produce on that account. He has no guarantee that he will obtain a higher price for his milk because it comes from a tubercle-free herd, nor is he likely to procure more in the open market for an animal because of its being guaranteed free from tuberculosis. To his (Professor Browne's) mind the whole *crux* of the situation lay in the education of the consumer of milk and meat. Once the consumer was made alive to the dangers of impure milk and meat he would doubtless be willing to pay more for a supply guaranteed pure; then, and only then, would a stimulus be produced, and an end in view created for a farmer to take steps for eradication. Of course, the State would have to step in and bear the greater part of the burden at the beginning of the campaign, by giving compensation for diseased animals slaughtered in the public interest. There is no doubt, however, that the campaign would be well advanced before the ordinary farmer could be brought to realise that from an economic point of view alone "the game would be worth the candle." He thought that they should admit that the present condition of affairs with regard to the meat and milk supply were deplorable. In some of the larger cities steps were being taken to protect the public in this respect, but in the majority of towns the consumer was almost entirely at the mercy of the producer.

In this campaign everyone would admit that the veterinary profession must play the most important part, and yet, even of late, they had reason to believe that

they were being ignored to a large extent in this connection; for the Astor Committee, which was recently appointed to investigate the production and distribution of the milk supply in the United Kingdom, did not contain the name of a single veterinarian. Again quite recently the Minister of Health appointed a committee to investigate the production and distribution of the meat supply in Great Britain, and only one of the eleven members of which this committee consisted was a veterinarian. If we as a profession are to take the active part in this matter—which everyone admits we must—it is about time we got the recognition we deserve. He had not very much to reply to; for although very many points of great interest had been raised by the different speakers, the adverse criticisms were relatively few. There were a few points, however, to which he would like to refer. Mr. Dunlop raised the question of heredity, and believes that it plays a very important part in the dissemination of tuberculosis in animals. He (Prof. Browne) quite admitted that some individual animals were more susceptible to the disease than others, but there is really no reliable evidence which proves that there is any inherited predisposition. It has yet to be proved that the offspring of tuberculous animals more easily fall victims to the disease than those of healthy ones. Everyone admits that in the human subject it is very prevalent in some particular families, but that could be explained, to a large extent at least, by the fact that the individuals of the same family were living constantly in contact with one another, so that heredity is often blamed where infection is the real factor. It is still a question whether if the individuals of such families had been separated immediately after birth, they would have fallen victims to the disease more readily than those of normal families. It is a well known fact that many tuberculous families are the offspring of healthy parents.

Mr. Dolan said that he believed the percentage of tuberculosis of the udder in cows was not so high as that stated in the paper. He (Prof. Browne) said that may be so for Dublin, but one to two per cent. was the figure given for cows in Great Britain. Mr. Dolan also seemed to think that the clinical diagnosis of tuberculosis of the udder was a comparatively easy matter—much easier than the statements in the paper would lead one tobelieve. He himself could not agree with that, and he never had met anyone who would take it upon himself to make a positive diagnosis of this condition right off, from a clinical examination alone.

In conclusion, he again thanked the various speakers for the very interesting discussion which they brought forward.

PARLIAMENTARY.

In the House of Lords, Tuesday, December 13th.

Government of Ireland Bill.

Lord Strachie (on behalf of Lord Bledisloe) moved, in subsection (2), after "fisheries" where that first occurs, to insert "and the administration of the Diseases of Animals Act." The noble Lord said: The object of the Amendment is to provide that the Diseases of Animals Acts in Ireland shall not be administered by the two separate Parliaments of the North and the South, but by the Irish Senate, which acts for the whole of Ireland. I think your Lordships who are interested in agricultural matters will see the enormous importance of providing that there should be no divided administration of matters of so much importance as the protection of the flocks and herds in Ireland. It not only affects Ireland, but Great Britain as well, because it is of the utmost importance that any cattle, or sheep, or swine that are sent to Ireland should come over here with an entirely clean bill of health. There have been cases in which outbreaks of foot-and-mouth disease, and also swine fever, have been caused by the importation of Irish cattle into Great Britain. It is therefore essentially an English as well as an Irish interest to see that the very best possible body should be established in Ireland for administering the Diseases of Animals Acts. There is also a precedent for this, because when Parliament thought fit to constitute a Board of Agriculture for Scotland it was unanimously decided, with the consent of all parties, that, as far as these Acts were concerned, they were to be administered by the English Board of Agriculture in Scotland as well as in England, in order that there might be continuity of administration and uniformity of Orders in the two countries. In the same way it would be very desirable that in the case of the North of Ireland and the South of Ireland there should not be different administration or different procedure, and that we should get the guarantee of a united Ireland in regard to any animals exported to this country.

Amendment moved—

Page 11, line 19, after ("fisheries") insert ("and the administration of the Diseases of Animals Acts").—(*Lord Strachie.*)

The Earl of Mayo: I have a somewhat similar Amendment on the Paper. There can be no doubt that, on account of the want of a natural barrier between the six counties and the rest of Ireland, the Diseases of Animals Acts can only be properly administered by a veterinary service dealing with the whole country, and acting from one centre. I should have thought that any one who understood anything about the moving of cattle and sheep would see that it was essential that one body should deal with those Acts. I have no doubt I shall be faced with the argument that if you make it a rule in the case of these Acts, why should not you make it a rule with the diseases of human beings? But human beings can talk and animals cannot. Considering that cattle and sheep and swine constitute Ireland's most important wealth, it is absolutely essential that one body should deal with this matter.

The Earl of Selborne: I should like to emphasise what Lord Strachie has said. This really is an English and Scottish matter as well as an Irish. I need not dwell on the enormous importance of keeping foot-and-mouth disease out of these Islands, and swine fever down as low as possible. Most unfortunately there are two authorities in these Islands, one for Great Britain and one for Ireland, and that is one too many already. Mercifully we escaped a third when the Board of Agriculture was established in Scotland, but here, as the Bill is drafted, we are going to have three after all, and I sincerely hope that the Lord Chancellor will accept this Amendment.

The Lord Chancellor: The objection to the Amendment occurs to one at once, that this is one of many very important services which would work less conveniently and less smoothly under the process of division which this Bill effects than under unity of administration. I should have thought that it would have been possible, on the arguments put forward by the supporters of the Amendment, to justify a proposal that a great many other functions should be entrusted to the joint body, but the noble Earl, Lord Selborne, speaks with very great authority on these matters and with actual experience of the Department, and I do not think that I should be justified in putting your Lordships to a Division upon it.

On Question, Amendment agreed to.

Lord STRACHIE: The next two Amendments are consequential upon the one just made.

Amendments moved—
Page 11, line 22, after ("fisheries") insert ("and the contagious diseases of animals")
line 23, after ("fisheries") insert ("and the contagious diseases of animals").—(*Lord Strachie*).

On Question, Amendments agreed to.

In the House of Commons, on Tuesday, 14th inst.

Mr. BONAR LAW, Lord Privy Seal (Glasgow Central, C.U.), replying to Sir W. De Frece (Ashton-under-Lyne, C.U.), said the Government would not be able to find time for any of the following Bills:—. . . Public Health (Tuberculosis) Bill . . . Milk and Dairies Bill . . . It was not proposed to carry any of them over by resolution.

To the Editor of The Veterinary Record.

APPEAL FOR HELP TO VIENNA VETERINARY SURGEONS.

The situation in Austria is desperate. The kronen, formerly worth about 10d. is now worth one-tenth of a penny, and its value is getting lower still. The war has raised the National debt to seventy thousand million kronen. The deficit for the year is 1½ times the whole of the Revenue. Commodities of all sorts are at famine prices. The middle classes in Vienna are suffering cruel privations, and there is no hope apart from the intervention of the allied countries. Unless that is forthcoming, stark misery and death will confront the whole population. This is not due to Bolshevism, for there is little of that in Austria, but if Austria were left to famine and disease, all surrounding countries will suffer, and there is no doubt that convulsions would be stirred up which might lead to a worse kind of war than the last. For the sake of the peace of Europe, Austria must be saved, and help must be given quickly.

The veterinary surgeons of Vienna have appealed to their colleagues in this country for assistance. They lack everything, but especially food. The appeal recently made brought a few subscriptions (amounting to (£15. 8s.) This has been sent to the Imperial War Relief Fund to be earmarked for the use of the veterinary surgeons of Vienna; but though the sum sent is now, owing to the rate of exchange, equal to 30,000 kronen, the value of commodities is so high that it will not buy a normal £15 worth of food. So small a sum can be of little use when divided among the 100 veterinary surgeons of Vienna and their families who are in dire want.

Any veterinary surgeon who wishes to help his unfornate colleagues in Austria, should send his donation (made payable to F. Bullock) to the Honorary Secretary of the fund at 10, Red Lion Squrre, London, W.C., when it will be at once acknowledged and duly transmitted.

"THE PLIGHT OF VETERINARY SURGEONS."

"The enormous extension of the adoption of motor-propelled vehicles, followed by the corresponding decline in horse traffic, is having, we are told, a most prejudicial effect upon the practices of veterinary surgeons. In towns the sphere of their services is practically limited to cats and dogs—a sphere of unstable demand and of negligible value. In country districts, although the situation is somewhat less acute, it is not very much better. The increasing adoption of motor traction on farms is enabling farmers to reduce the number of their horses, conceivably to the loss of the veterinary surgeon. The future outlook, therefore, of the profession seems to be endangered, and now affords but meagre prospects for earning a livelihood. The views of the Royal College of Veterinary Surgeons would be interesting upon this point. According to our information many veterinary surgeons are relinquishing their profession and seeking other occupations, owing to the exigency of the times." *The Medical Press*, Dec. 8th.

THE CLYDESDALE IN THE CRUCIBLE.

The following letter appeared in *The Scottish Farmer* of Dec. 4th.—

"With reference to your interesting leader on the above subject in the last issue of *The Scottish Farmer*, might I trouble you with a suggestion which, I think, if it were given effect to, would go a long way to accomplish the desire you express to have the percentage of Clydesdale sires, condemned under the scheme of the Board of Agriculture, reduced, especially those afflicted with stringhalt or shivering?

Mr. Wood's figures show that, together, these unsoundnesses were responsible for the condemnation of twenty stallions. I am of the opinion that the Council of the Clydesdale Horse Society would achieve increasingly good results in the elimination of these affections of the nervous systems from the breed, if they made it a condition of qualification for a number in the Stud Book "That in the case of every colt the owner should furnish a certificate by an accredited veterinary surgeon that his dam is free from shivering or stringhalt."

It is common knowledge that not a few highly-pedigreed brood mares are markedly unsound on account of shivering or stringhalt, and, if my proposal were acted on, their colt foals, which are always a menace because of the insidious character of hereditary complaints, would fail to get a number.

I hope you will agree that those who have the best interests of the breed at heart would consider such a proposal as unobjectionable, since it would operate to enhance the future soundness of our valuable breed of Clydesdale horses.—Yours, etc.,

Maybole. WALTER GABDNER, M.R.C.V.S

OBITUARY.

WILLIAM GARTON DIXON, M.R.C.V.S., St. Helen's Lancs. Graduated Lond: March, 1875.
Died 8th December, aged 66.

WILLIAM KENNEDY JOHNSTONE. M.R.C.V.S., The Abattoirs, Manchester. Edin: May, 1906.
Died 11th December, aged 69.

W. KIDD, M.R.C.V.S., Boningale Manor, Mr. Albrighton. New Edin: April, 1886.
Died 9th December, aged 62.

WILLIAM JACKSON MOORE, M.R.C.V.S. Conservative Club, St. James Street, London, S.W.
Lond: April, 1871.

LARGE INTESTATE ESTATE.

Mr. William Jackson Moore, of Alexander Place, Thurloe Square, S.W., and the Conservative Club, who died on June 18th, intestate, a widower without child or parent has left an estate of the gross value of £195,482, the net personality being £195,439. Letters of administration are granted to his sisters, Mrs. Margaret Anne Mitford, care of the London County, Westminster and Parr's Bank, and Mrs. Emma Fairrie, of Beach Grove, Hoylake, Chester, two of the next-of-kin.—*The Times*.

Testing for Tuberculosis, U.S.A.

Since the beginning of the work about three years ago the U.S. Department of Agriculture has removed 74 herds of cattle from the list accredited as being free from tuberculosis. The presence of one or more reactors was the cause for removal. The number of herds taken off the list is small compared with the total number of accredited herds, which now exceeds 4,000. In most cases where reactors were found among cattle which had passed the requisite number of official tests, reinfection was traced to carelessness. Either the accredited animals had been permitted to run in pastures with infected cattle or else animals of doubtful health had been brought on the premises and stabled with the others. Where only one reactor is found in an accredited herd it is possible for that herd to get back on the list again within six months if a retest at that time shows the herd to be clean. When several reactors are found it takes from a year to a year-and-a-half for the herd to again become accredited. In all cases reactors must have been removed.

Rabies.

The Ministry of Agriculture and Fisheries announce (Friday Dec. 10) that a case of rabies in a dog at Acton has been confirmed. An order has consequently been made in an inner controlled area comprising Ealing, Hammersmith, Willesden, Acton, Chiswick, Old Brentford, Isleworth, Twickenham, Heston, Norwood (adjoining Hanwell), Hanwell, Greenford, Perivale, Wembley, and West Twyford. Dogs must not be moved out of this area.

The movement of dogs is also prohibited from a district surrounding the inner area and including the whole of the County of London, the greater part of Middlesex, and small parts of Surrey, Berkshire, and Buckinghamshire.

Special transit licences will be issued allowing the passage through London of dogs from one free area to another.

The "Mystery Ship."

The Ministry of Agriculture mystery ship, on which elaborate investigations, with a view to stamping out foot-and-mouth disease are to be conducted, is shortly to go to sea. Secrecy is being observed as to the locality of the ship and off which coast it will ultimately be stationed. When she once gets out, no communication between her and the shore or with other vessels will be allowed. The Admiralty has fitted up the vessel with laboratories and other essentials for the study of the disease. The ship is the *Dahlia*, one of 21 sloops built in 1915, and popularly known as the "Flower Class." She is of 1200 tons displacement, and a good sea boat. During the war, with her sisters, she was very successful in working up mines. With the *Dahlia* will also be a lighter.

The research, which may last for years, will be conducted by members of the staff of the Ministry and other scientists. The problem of dealing with foot-and-mouth disease is a very serious one for British agriculturists. At the present time all infected animals are destroyed.

Foot-and-Mouth Disease.

The existence of foot-and-mouth disease was certified on a farm near Hereford on Monday 13th inst. Seventeen cattle have been already slaughtered.

The Ministry of Agriculture have closed practically all stock stock markets in the county, which at this period of the year means a great loss to county feeders.

DISEASES OF ANIMALS ACTS 1894 TO 1914, SUMMARY OF RETURNS.

Period.		Rabies. Cases Confrmd. Dogs	Rabies. Cases Confrmd. Other Anmls	Anthrax. Out-breaks (a)	Anthrax. Animals.	Foot-and-Mouth Disease. Out-breaks (a)	Foot-and-Mouth Disease. Animals.	Glanders.† Out-breaks (b)	Glanders.† Animals.	Parasitic Mange. Out-breaks (b)	Parasitic Mange. Animals.	Sheep Scab. (b)	Swine Fever. Out-breaks (a)	Swine Fever. Slaughtered. *
GT. BRITAIN. Week ended Dec. 11		3		19	27		405			43	61	26	20	3
Corresponding week in	1919	2		6	7	1	78	1	1	111	185	30	35	14
	1918	4	6	2	2			2	4	118	220	20	32	13
	1917			7	8				2	87	148	25	26	7
Total for 50 weeks, 1920		37		436	522	80	11203	15	22	3465	5659	446	1763	698
Corresponding period in	1919	150	5	223	294	71	3144	23	59	4759	9357	380	2235	1015
	1918	90	9	234	270	3	40	33	97	4239	7991	337	1357	544
	1917			407	463			25	56	2416	4488	500	2059	864

(a Confirmed. (b) Reported by Local Authorities.
Board of Agriculture and Fisheries, Dec. 14, 1920

† Counties affected, animals attacked :—
Excluding outbreaks in army horses.

IRELAND. Week ended Dec. 11		...	...	...	...			Outbreaks		12		1	3	
Corresponding Week in	1919	...	...	...	...	...	...	1		11		1	6	
	1918	...	...	...	...	...	...	1		14				
	1917	...	...	...	...	...	...	4		12				
Total for 50 weeks, 1920		1	1	...	...	1	3	92		329		15	44	
Corresponding period in	1919	...	...	...	...	1	1	137		277		33	102	
	1918	...	2	2	...	...	...	96		324		29	129	
	1917	...	3	5	...	1	1	45		407		197	1127	

Department of Agriculture and Technical Instruction for Ireland, (Veterinary Branch), Dublin, Dec. 13, 1920.

NOTE.—The figures for the Current Year are approximate only.

* As Diseased or Exposed to Infection.